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11. (Amended) The omniazimuthal visual system of claim 1, wherein the arithmetic/logic circuit is a perspective transformation circuit which only requires changing two parameters of the image in order to alternatively perform a pan/tilt function, or which only requires changing one other parameter of the image in order to alternatively perform a zoom-in/zoom-out function, using the image data output from the imaging section.

#### REMARKS

Claims 1-11 are present in the above-identified application. Claim 1 is an independent claim.

#### DRAWINGS

Figure 10 has again been objected to for not being designated "Prior Art". Applicants respectfully traverse this objection.

In particular, the Office Action alleges that the drawing should be labeled "Prior Art" because it is old. Applicants submit, however, that the drawing is not "prior art" in the statutory sense and Applicants do not admit that it is such. The subject matter of the drawing is clearly described in the subject Specification as a "conventional omniazimuthal visual system." Furthermore, Applicants submit that the subject matter of Figure 10 was based on Applicants own work and was provided only to help emphasize the novel features of the present invention. It was subject matter that was known only to Applicants. The subject matter of Figure 10 was not based on prior art and has not been previously disclosed to the public.

The Office Action also provides a counter-argument that the drawing should be labeled “prior art” because Applicants do not provide any factual evidence to support that the drawing is conventional. The Office Action further alleges that because the brief description of the drawing on page 16 labels the drawing as “conventional” that it is prior art. Applicants, however, do not admit that the drawing was derived from prior art, in the statutory sense. It is not the responsibility of Applicants to determine if their own disclosure is prior art. Rather, Applicants submit that the burden is on the Examiner to provide evidence in the form of prior art. Further, the label “conventional” was used in order to indicate that the drawing depicts subject matter that lead up to the present invention.

Thus, Applicants provide herewith a drawing correction to label the drawing in Figure 10, as “Related Art.” Accordingly, Applicants request that the objection be withdrawn.

**CLAIM REJECTION UNDER 35 U.S.C. 112, FIRST PARAGRAPH**

Claims 10 and 11 have been rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification. In particular, the Office Action alleges that the claimed “only requires changing one parameter in order to alternatively perform a pan function...” is not disclosed in the specification. Applicants disagree.

Claim 10 has been amended to recite –one parameter of the image—in order to describe what the parameter relates to. Support for this limitation can be found

on page 24, line 18 to page 25, line 25 of the present Specification. From the description, it is clear that by changing the parameter  $\theta_0$  of a reference point, a pan movement can be achieved for the image.

Claim 11 has been amended to recite – two parameters of the image--. Support for this limitation can be found on page 30, lines 22-25 and page 32, lines 2-5 of the present Specification. The limitation relates to performance of pan or tilt movement for a perspective transformation. In order to perform pan or tilt movement for a perspective transformation, it is necessary to change the parameters  $W$  and  $h$  of the image.

Accordingly, Applicants respectfully request that the rejection be withdrawn.

#### **CLAIM REJECTION UNDER 35 U.S.C. 103**

Claims 1-11 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Applicants admitted prior art (Figure 10) in view of Juday, et al. (U.S. Patent No. 5,067,019, hereinafter referred to as Juday). Applicants respectfully traverse this rejection. **The subject matter of Figure 10 is not prior art in the statutory sense.** The label “convention” was used to distinguish that subject matter from the present invention and was provided in order to emphasize the important features of the present invention.

The Office Action repeats the previous rejection and adds a counter argument that Applicants have not provided any factual evidence to support the statement that “Figure 10 is not in fact prior art but instead is a prior

iteration of the present invention known only to applicants.” Applicants disagree that applicants are required to provide factual evidence to support that disclosed subject matter is not prior art. Rather, Applicants submit that the burden is on the Examiner to provide evidence in the form of prior art.

Applicants submit that because the subject matter of Figure 10 is not prior art in the statutory sense, and Applicants have not admitted as such, it is **not proper evidence of obviousness**. Applicants did not derive the subject matter of Figure 10 from prior art and Applicants did not intend to admit that it is prior art through its use of the label “conventional.” Applicants have consistently referred to the subject matter of Figure 10 as “conventional” only to distinguish that subject matter from the present invention. The subject matter of Figure 10 was based on Applicants own work and represented an iteration that lead to the present invention. Further, Applicants presented the subject matter of Figure 10 in order to emphasize important features of the present invention.

If an applicant does admit that something is prior art, it can be used in obviousness rejections. (See MPEP 2129). To Applicants knowledge, there is no requirement that Applicants admit that subject matter is prior art, when they do not believe that it is such. Thus, Applicants submit that the subject matter of Figure 10 cannot be relied on as prior art in the statutory sense.

Accordingly, at least for this reason, Applicants submit that the rejection does not establish *prima facie* obviousness.

Even assuming, *arguendo*, that the Applicants' own disclosure with respect to Figure 10 is prior art, which Applicants do not concede, all claimed elements are not taught or suggested by the combination of Figure 10 and Juday.

The present invention is directed to a visual system for use in surveillance systems and mobile robots. The disclosed visual system includes an omniazimuthal visual system capable of obtaining an image of 360° field of view and an image transformation circuit capable of processing the 360° field of view image for various alternative panoramic or perspective transformations. Among the omniazimuthal visual systems used include a hyperboloidal mirror optical system (shown in detail in Figure 2), or a paraboloidal mirror optical system (shown in detail in Figure 9).

A disclosed hardware implementation eliminates the need for storage of intermediate results, implements specific image transformation functions in circuits which use only linear operations and can perform alternative functions just by changing parameters, and uses a look-up table for storing trigonometric functions. For example, based on the circuit for panoramic transformation, by changing only one parameter, the same circuit can alternatively be used to perform a pan function based on image data from an image section. Similarly, the circuit for prospective transformation can alternatively be used for pan/tilt, zoom-in/zoom-out computations by changing only one parameter. Thus, Applicants have produced a versatile visual system that can perform at high enough processing speed for use in surveillance and mobile robot systems.

**DIFFERENCES OVER JUDAY**

The present claimed invention is directed to an omniazimuthal visual system comprising an optical system capable of obtaining an image of 360° view field area as well as an image transformation section for performing coordinate transformation on data obtained from that optical system. The image transformation section, capable of processing an image of 360° view field area, includes at least one buffer memory, an arithmetic/logic circuit, a look-up table, and a CPU. The look-up table provides a trigonometric function and works with the arithmetic/logic circuit.

The Office Action alleges that Applicants Admitted Prior Art teaches the present invention, with the exception that the Admitted Prior Art discloses the comparable software to perform the image transformation while the claimed invention is directed to a hardware implementation. In particular, the Office Action states that “[T]he only thing different from the prior art admitted by applicant and the claimed invention is that the image transformation section (1007) of the prior art uses software to perform the transforming the image data into display data whereas the claimed invention uses hardware such as buffer memory, and arithmetic/logic circuit, a lookup table and a CPU to perform the transforming the image data.” The Office Action goes on to rely on Juday for teaching the deficiency of the Admitted Prior Art of the specific image transformation hardware that would replace the software. Applicants submit, however, that Juday fails to teach or suggest at least an image transformation section that includes an arithmetic/logic circuit for performing coordinate

transformation based on image data obtained from an image of 360° view field area, as well as a look-up table of a trigonometric function for use in the arithmetic/logic circuit, as in present claim 1.

First of all, Juday is directed to a programmable remapper that works with a conventional video camera. It is not directed to transformation of an image over a 360° view field area, in an omniazimuthal visual system having an optical system capable of obtaining the image of 360° view field area.

Second of all, Juday does not teach or suggest a look-up table providing a trigonometric function which is used to achieve transformation of polar coordinates to rectangular coordinates. Neither of the look-up tables in Juday provides a trigonometric function. The Office Action alleges that the factor look-up table 36 or the address look-up table 34a disclosed in Juday constitutes the claimed look-up table of a trigonometric function. However, the factor look-up table only produces weighting factors to be used to achieve the remapping of two-dimensional video images. The address look-up table is for associating addresses with pixels.

Furthermore, Juday does not disclose, for the sake of argument, performing coordinate transformation based on circular image data from an optical field of view of 360°. The Office Action alleges that the multipliers 30 and 68, and the adders 42 and 72 constitute an arithmetic/logic circuit for performing coordinate transformation. However, Juday is directed to a general purpose programmable remapper that works with input preferably from a

conventional video camera. The transformations that the programmable remapper performs are from one Cartesian matrix to another Cartesian matrix.

With respect to claim 3, the Office Action, in a counter-argument, states that the claim does not recite the limitation “without a need for addition, *sic* (additional), buffer memory.” Applicants agree that the claim does not specifically recite that limitation. Rather, claim 3 is directed to first performing zoom-in or zoom-out processing or pan/tilt processing, then performing one of panoramic or prospective processing. As disclosed on page 22 of the present specification, Applicants have found that by following such a procedure, transformation can be carried out without a need for an additional buffer memory. Thus, as a result of the sequence of operations transformation can be carried out without a need for an additional buffer memory. Juday, nor any of the other references disclosed in the present specification, teach or suggest this procedure as part of image transformation. Accordingly, at least for this additional reason, Juday, either alone or in combination with the references disclosed in the present specification, fails to teach or suggest all elements of claim 3.

With respect to claims 10 and 11, the Office Action alleges that the limitations recited in claims 10 and 11 are met by prior art by Juday, and states as an example that Juday clearly teaches a pan function. Applicants disagree, however. The claims are not just directed to performing a pan function, or a pan/tilt function, etc. Rather, claim 10 is directed to a panoramic transformation circuit which alternatively performs a pan function



(e.g., as shown in Figure 6). Claim 11 is directed to a perspective transformation circuit which alternatively performs a pan/tilt function or a zoom-in/zoom-out function (e.g., as shown in Figures 7 and 8). In other words, the claims are directed to circuits that perform alternative functions, and only require changing one parameter to perform the alternative function. Applicants submit that Juday fails to teach or suggest such circuits. Thus, Applicants submit that the Admitted Prior Art and Juday, either alone or in combination, fail to teach all claimed limitations of claims 10 and 11.

With respect to the remaining dependent claims, at least for the same reasons as above for claim 1, the Admitted Prior Art and Juday, either alone or in combination, fail to teach or suggest all of the claimed elements of those claims as well. Accordingly, Applicants respectfully request that the rejection under 35 U.S.C. 103 be withdrawn.

### **CONCLUSION**

In view of the above remarks, reconsideration of the rejections and allowance of each of claims 1-11 in connection with the above identified application is earnestly solicited.

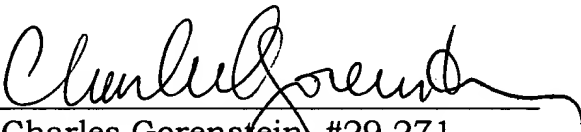
Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Robert W. Downs (Reg. No. 48,222) at the telephone number of the undersigned below, to

**arrange for an interview** in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

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10. (Amended) The omniazimuthal visual system of claim 1, wherein the arithmetic/logic circuit is a panoramic transformation circuit which only requires changing one parameter of the image in order to alternatively perform a pan function using the image data output from the imaging section.

11. (Amended) The omniazimuthal visual system of claim 1, wherein the arithmetic/logic circuit is a perspective transformation circuit which only requires changing [one parameter] two parameters of the image in order to alternatively perform a pan/tilt function, or which only requires changing one other parameter of the image in order to alternatively perform a zoom-in/zoom-out function, using the image data output from the imaging section.